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ASSESSMENT OF SPEECH AND SWALLOWING AFTER LARYNGECTOMY IN LARYNGEAL AND HYPOPHARYNGEAL MALIGNANCIES IN A TERTIARY CANCER CARE CENTRE

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ABSTRACT

Background: Total laryngectomy affects patients' post-operative speech and swallowing functions. It is important to identify factors that may negatively influence swallowing after laryngectomy in order to rehabilitate these patients. We aimed to assess these outcomes. **Methods:** The study included patients who underwent laryngectomy from January 2024 to June 2025 for laryngeal and hypopharyngeal malignancies. Patients' normalcy of diet, ability to eat in public and speech comprehensibility were assessed using the Performance Status Scale for Head and Neck Cancer. Student's t-tests were employed for statistical analysis. **Results:** Forty two laryngectomies (33 men and 9 women), with a mean age of 64 ± 10.7 years, were included. Mean scores were 83.5 ± 17.7 for normalcy of diet, 76.4 ± 21.3 for eating in public and 61.4 ± 16.7 for speech. Normalcy of diet achieved higher scores within six months of laryngectomy and remained stable (p=0.295). There was a statistically significant difference between scores for the speech (p=0.012) and public eating (p=0.017) domains, comparing patients less and more than six months post-laryngectomy. **Conclusion:** In post-laryngectomy patients, Performance Status Scale for Head and Neck Cancer scores improved over time, especially those for the speech and public eating domains, reflecting increasing confidence in social interactions and familiarity with surgical voice restoration.

INTRODUCTION

Total laryngectomy, a surgical intervention for treating laryngeal and hypopharyngeal malignancies, represents a significant turning point in patients' lives, fundamentally altering their speech and swallowing functions.(1)

While tracheoesophageal valved speech has emerged as the gold standard for voice rehabilitation over recent decades, with studies confirming its superiority over alternative methods, the comprehensive assessment of postoperative functional outcomes remains a critical yet underexplored area. Despite the availability of numerous health-related quality of life (QoL) studies in head and neck oncology, research specifically focusing on laryngectomees' functional outcomes has been limited.(2)

The impact of total laryngectomy extends beyond voice rehabilitation to encompass significant swallowing challenges. Multiple factors including scarring, neopharyngeal stenosis, and the effects of adjuvant radiation therapy, can influence post-operative swallowing function(1). Although subjective swallowing inventories often indicate patient satisfaction(3), there exists a notable gap between patient-reported outcomes and objective functional assessments. Current QoL measures, primarily developed using classical test theory, provide population-level domain scores but may not accurately reflect individual functional status, particularly for laryngectomees(4,5).

This study aims to address this research gap by prospectively evaluating the functional status of a substantial cohort of laryngectomees using the Performance Status Scale for Head and Neck Cancer (PSS-HN), a validated assessment tool specifically designed for head and neck cancer patients. This investigation seeks to provide a more comprehensive understanding of post-laryngectomy functional outcomes, ultimately contributing to improved rehabilitation strategies and patient care.

MATERIALS AND METHODS

Ethical Considerations

Present study was conducted after obtaining approval from the Institutional Ethics Committee. Performance Status Scale for Head and Neck Cancer (PSS-HN) evaluations were performed as part of the approved protocol.

This was a hospital-based Prospective study conducted at the Department of Head and Neck Oncology, State Cancer Institute, Guwahati. The study duration was from January 2024 to June 2025. The study included 42 patients.

The Performance Status Scale for Head and Neck Cancer (PSS-HN) was used to evaluate three primary domains:(6)

1. The Public Eating Scale ranges from 0 to 100, where a score of 100 indicates complete freedom to eat anywhere, with any food, and any company. At 75 points, individuals can eat in public but may choose less messy foods, while a score of 50 represents eating only in specific places with

select companions. A 25-point score indicates eating is restricted to home with chosen individuals, and 0 means the person always eats alone.

2. The Speech Clarity Scale also spans 0 to 100, with a perfect score indicating consistently clear speech. At 75 points, speech is generally understandable with occasional need for repetition, while 50 points suggests comprehension requires face-to-face interaction. A 25-point score indicates difficult-to-understand speech, and 0 means reliance on written communication.
3. The Diet Normalcy Scale offers more detailed gradations from 100 (full unrestricted diet) through various capabilities: peanuts (90), all meat (80), carrots and celery (70), dry bread and crackers (60), soft chewable foods (50), soft foods without chewing (40), pureed foods (30), warm liquids (20), cold liquids (10), down to non-oral/tube feeding at 0.

Scoring System

Each domain uses a hierarchical continuum with:

- Maximum score of 100 representing normal function
- Minimum score of 0 representing total incapacitation
- Intermediate scores reflecting varying levels of function

Data Collection

The PSS-HN questionnaire was administered. Ratings were determined through an unstructured interview format, ensuring comprehensive coverage of all domains.

Statistical Analysis

The statistical analysis of the data utilized Student's t-test for group comparisons. A comprehensive data analysis was conducted to examine differences between domains and evaluate functional outcomes. Throughout the analysis, statistical significance was determined using a threshold of $p < 0.05$.

RESULTS

The study examined 42 post-laryngectomy patients who underwent surgery for laryngeal and hypopharyngeal malignancies. The patient population showed a significant gender disparity, with males comprising 78.6% (33 patients) and females 21.4% (9 patients). The average age of the participants was 64 ± 10.7 years. The functional assessment, conducted using the Performance Status Scale for Head and Neck Cancer, demonstrated that patients scored highest in normalcy of diet, moderately well in eating in public, and faced more challenges with speech comprehensibility (Table-1). The dietary outcomes were particularly encouraging, with 53.2% of patients maintaining a full diet without restrictions, and approximately 90% managing at least soft, chewable foods. Only a small fraction (5.1%) required tube feeding for nutrition.

The study also analyzed functional outcomes based on post-operative duration. While normalcy of diet scores showed no significant difference between patients less than six months post-surgery (81.2 ± 18.3) and those beyond six months (85.7 ± 16.9; p= 0.295), other metrics demonstrated notable improvements over time. Eating in public scores increased significantly from 68.9 ±23.1 at less than six months to 83.8 ± 17.2 after six months (p = 0.017). Similarly, speech comprehensibility showed significant improvement, rising from 54.6 ± 17.8 to 68.2± 12.4 (p = 0.012) over the same time frame. In terms of speech outcomes, 13.9% of patients achieved complete understandability, while 48.1% were understandable most of the time with occasional repetition needed. Only 2.5% experienced complete speech incomprehensibility requiring written communication.

Table-1: Performance Status Scale for Head and Neck Cancer Scores by Post-Laryngectomy Time

Time (Months)	Normalcy of diet	Eating in public	Speech
<6	81.2 ± 18.3	68.9 ± 23.1	54.6 ± 17.8
>6	85.7 ± 16.9	83.8 ± 17.2	68.2 ± 12.4

However, the type of treatment received (Salvage TL, TL+RT, or NTL+RT) did not significantly impact functional outcomes in terms of eating, speech, and public dining abilities (Table-2). This suggests that the choice of treatment approach does not substantially affect post-operative quality of life, with all treatment groups showing comparable results across the measured parameters.

Table-2: Performance Status Scale for Head and Neck Cancer Scores by Treatment Type

Treatment	Normalcy of diet	Eating in public	Speech
Salvage TL	79.8 ± 30.7	81.1 ± 24.2	65.2 ± 22.5
TL+RT	79.4 ± 28.8	71.1 ± 32.4	63.3 ± 27.7
NTL+RT	90.7 ± 26.4	85.7 ± 36.3	69.6 ± 14.5

DISCUSSION

The present study represents one of the larger series (n=42) examining functional outcomes in laryngectomees using the Performance Status Scale for Head and Neck Cancer (PSS-HN). Previous studies have typically involved smaller cohorts or focused on different assessment tools.

Present study findings regarding swallowing function are particularly encouraging, with 53.2% of patients achieving unrestricted diet and approximately 90% managing at least soft, chewable foods. These results are consistent with recent large-scale observations in population-based studies, where approximately 75% of laryngectomees could manage satisfactory swallowing function(1). This suggests that despite the anatomical alterations following total laryngectomy, most patients can achieve satisfactory swallowing function.

The temporal improvement in functional outcomes observed in present study, particularly in speech and public eating domains, aligns with recent longitudinal studies documenting improvements across all domains by six months post-operation(6,8). Present study provides stronger statistical evidence for this trend, with significant improvements in both eating in public (p=0.017) and speech comprehensibility (p=0.012) after six months. This improvement likely reflects patients' increasing confidence in social interactions and growing familiarity with their surgically restored voice, as suggested by contemporary research(7,9).

Regarding speech outcomes, our finding that 13.9% of patients achieved complete understandability, with 48.1% being understandable most of the time, is consistent with current literature on tracheoesophageal voice restoration. Recent studies demonstrate that tracheoesophageal speech prostheses represent the gold standard for voice rehabilitation, with success rates ranging from 65% to 85%(7). This highlights the ongoing challenges in voice rehabilitation post-laryngectomy while also demonstrating significant progress in modern rehabilitation techniques.

The lack of significant difference in functional outcomes between different treatment modalities (Salvage TL, TL+RT, or NTL+RT) corresponds with contemporary findings in large population-based studies(1). This suggests that the functional rehabilitation potential remains similar regardless of the treatment approach, which is valuable information for pre-operative counseling.

Recent systematic reviews and prospective studies have emphasized the importance of comprehensive rehabilitation programs, noting that while total laryngectomy presents initial functional challenges, particularly in speech and public eating, most patients achieve satisfactory functional outcomes over time(2,4,8). The improvement in scores beyond six months post-operation emphasizes the importance of continued support and rehabilitation during this critical period.

These results provide valuable data for pre-operative counseling and highlight the need for comprehensive

rehabilitation programs focusing particularly on speech and social eating skills in the early post-operative period. Future research might benefit from prospective studies with predefined assessment time points to better delineate the trajectory of functional recovery.

CONCLUSION

This study of post-laryngectomy patients reveals encouraging functional outcomes across multiple domains. Patients demonstrated strongest performance in diet normalcy, followed by public eating capability, while speech comprehensibility presented greater challenges. Notably, functional improvements were observed over time, with significant progress in both public eating and speech comprehensibility after six months post-surgery. The majority of patients maintained unrestricted diets, and most could manage soft, chewable foods. While speech outcomes varied, a substantial portion of patients achieved at least mostly understandable communication. Importantly, the type of treatment approach did not significantly impact functional outcomes, suggesting comparable efficacy across treatment modalities.

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